No. 9700196

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN, FIELD

'PHDG1'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this fifth day of February, in the year of our Lord two thousand one.

Attest:

Acting Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions.* FORM APPROVED - OMB NO. 0581-00

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act 1974 (5 U.S.C. 552a).

Application is required in order to determine if a plant variety protecti certificate is to be issued (7 U.S.C. 2421). Information is held confidenti until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Pioneer Hi-Bred International, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER

3. VARIETY NAME
PHDG1

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Research and Product Development
P.O. Box 85
Johnston, IA 50131-0085

6. TELEPHONE *(include area code)*
515/270-3300

6. FAX *(include area code)*
515/253-2125

FOR OFFICIAL USE ONLY

PVPO NUMBER
9700196

FILING DATE
MAR 12 1997

FEES RECEIVED
FILING AND EXAMINATION FEE:
$ 2,450.00
DATE
MAR 10 1997
CERTIFICATION FEE:
$ 320.00
DATE
10/10/00

7. GENUS AND SPECIES NAME
Zea Mays

8. FAMILY NAME *(Botanical)*
Gramineae

9. CROP KIND NAME *(Common name)*
Corn

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.) (Common name)*
Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
Iowa

12. DATE OF INCORPORATION
May 6, 1926

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
2/17/98
~~Alan R. Grunst~~ Mr. Steven R. Anderson
Research and Product Development
P.O. Box 85
Johnston, IA 50131-0085

14. TELEPHONE *(include area code)*
515/270-3328

15. FAX *(include area code)*
515/253-2125

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow instructions on reverse)*

a. ☒ Exhibit A. Origin and Breeding History of the Variety
b. ☒ Exhibit B. Statement of Distinctness
c. ☒ Exhibit C. Objective Description of the Variety
d. ☒ Exhibit D. Additional Description of the Variety
e. ☒ Exhibit E. Statement of the Basis of the Applicant's Ownership
f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository)*
g. ☒ Filing and Examination Fee ($2,460), made payable to "Treasurer of the United States" *(Mail to PVPO)*

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)?*
☐ YES *(If "yes," answer items 18 and 19 below)* ☒ NO *(If "no," go to item 20)*

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☐ NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☐ YES *(If "yes," give names of countries and dates)* ☒ NO

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*		SIGNATURE OF APPLICANT *(Owner(s))*	
		Alan R. Grunst	
NAME *(Please print or type)*		NAME *(Please print or type)*	
Pioneer Hi-Bred International, Inc.		Alan R. Grunst	
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
		Breeding & Self Application Coordinator	FEB 28 1997

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14A. Exhibit A. Origin and Breeding History

Pedigree: [redacted]G50/PHP02)X3K132311

JMS 5/25/00

Pioneer Line PHDG1, Zea mays L., a yellow corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross [redacted]G50 X PHP02 using the pedigree method of breeding. The progenitors of PHDG1 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing and selection were practiced within the above F1 cross for 7 generations in the development of PHDG1 at Eau Claire, Wisconsin. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Eau Claire, Wisconsin, as well as other Pioneer research stations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations made for uniformity.

PHDG1 has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed a sufficient number of generations with careful attention paid to uniformity of plant type to assure genetic homozygousity and phenotypic stability. The line PHDG1 has been increased both by hand and in isolated fields with continued observations for uniformity and stability throughout development, and for 3 generations during the final stages of inbred development and seed multiplication.

JMS 6/7/00

No variant traits have been observed or are expected in PHDG1.

The criteria used in the selection of PHDG1 were yield, both per se and in hybrid combinations; kernel size, especially important in production; ability to germinate in adverse conditions; number of tillers, especially important in production because having numerous tillers increases hybrid production costs spent on detasseling; disease and insect resistance; pollen yield; tassel size and pollen shed duration.

DEVELOPMENTAL HISTORY FOR PHDG1

Season/Year	Inbreeding Level
Summer 1985	F0
Winter 1985	F1
Summer 1986	F2*
Winter 1986	F3*
Summer 1987	F4*
Summer 1988	F5*
Summer 1989	F6*
Summer 1990	F7*
Summer 1991	F8*
Winter 1991	F9**

*PHDG1 was selfed and selected through F8 generation.
**PHDG1 was selfed and ear-rowed for F9 generation.

Exhibit B Novelty Statement

Variety PHDG1 mostly resembles the Pioneer Hi-Bred International, Inc. proprietary inbred line PHR31 (PVP Certificate No.9200090).

Variety PHDG1 reaches 50% pollen shed (GDUSHD) earlier (1325 GDU's vs 1369 GDU's) than PHR31 (Exhibit D).

Variety PHDG1 reaches 50% silking (GDUSLK) earlier (1368 GDU's vs 1399 GDU's) than PHR31 (Exhibit D).

Variety PHDG1 has a longer tassel peduncle length (19.3 cm vs 14.8 cm) than PHR31 (Table 1A, 1B).

Variety PHDG1 has a wider tassel branch angle (41.7 degrees vs 24.0 degrees) than PHR31 (Table 1A, 1B).

Variety PHDG1 has a thicker kernel thickness (5.1 mm vs 4.3 mm) than PHR31 (Table 1A, 1B).

Exhibit B Novelty Statement Tables

Table 1A Data from Johnston, IA in 1998 are supporting evidence for differences between PHDG1 and PHR31. Locations had different environmental conditions.

Station	loc	Year	Traits	Variety-1	Variety-2	Count-1	Count-2	Mean-1	Mean-2	Mean Diff	DF Pooled	t-Value Pooled	Prob (2-tail) Pooled
AD	20N	1998	kernel thickness (mm)	PHDG1	PHR31	5	5	4.8	4.2	0.6	8	2.12	0.067
JH	95	1998	kernel thickness (mm)	PHDG1	PHR31	5	5	5.4	4.4	1.0	8	2.89	0.020
AD	20N	1998	tassel branch angle (degrees)	PHDG1	PHR31	5	5	35.4	26.0	9.4	8	3.04	0.016
JH	95	1998	tassel branch angle (degrees)	PHDG1	PHR31	5	5	48.0	22.0	26.0	8	5.15	0.001
AD	20N	1998	tassel peduncle length (cm)	PHDG1	PHR31	5	5	18.6	14.2	4.4	8	4.02	0.004
JH	95	1998	tassel peduncle length (cm)	PHDG1	PHR31	5	5	20.0	15.4	4.6	8	9.02	0.000

Table 1B Summary data from Johnston, IA across 1998 are supporting evidence for differences between PHDG1 and PHR31 locations had different environmental conditions.

Year	Traits	Variety-1	Variety-2	Count-1	Count-2	Mean-1	Mean-2	Mean Diff	DF Pooled	t-Value Pooled	Prob (2-tail) Pooled
1998	kernel thickness (mm)	PHDG1	PHR31	10	10	5.1	4.3	0.8	18	3.39	0.003
1998	tassel branch angle (degrees)	PHDG1	PHR31	10	10	41.7	24.0	17.7	18	4.98	0.000
1998	tassel peduncle length (cm)	PHDG1	PHR31	10	10	19.3	14.8	4.5	18	6.95	0.000

9700196

Exhibit C
(Corn: Maize)

United States Department of Agriculture, Agricultural Marketing Service
Science Division, Plant Variety Protection Office
National Agricultural Library Building, Room 500
Beltsville, MD 20705

Objective Description of Variety
Corn (Zea mays L.)

Name of Applicant (s)	Variety Seed Source	Variety Name or Temporary Designation
Pioneer Hi-Bred International, Inc.		PHDG1
Address (Street & No., or RFD No., City, State, Zip Code and Country		FOR OFFICIAL USE
7301 NW 62nd Avenue, P.O. Box 85, Johnston, Iowa 50131-0085		PVP0 Number

Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by an '*' are considered necessary for an adequate variety description and must be completed.
COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices: describe #25 and #26 in Comments section):

01=Light Green	06=Pale Yellow	11=Pink	16=Pale Purple	21=Buff
02=Medium Green	07=Yellow	12=Light Red	17=Purple	22=Tan
03=Dark Green	08=Yellow Orange	13=Cherry Red	18=Colorless	23=Brown
04=Very Dark Green	09=Salmon	14=Red	19=White	24=Bronze
05=Green-Yellow	10=Pink-Orange	15=Red & White	20=White Capped	25=Variegated (Describe)
				26=Other (Describe)

STANDARD INBRED CHOICES
(Use the most similar (in background and maturity) of these to make comparisons based on **grow-out trial data**):

Yellow Dent Families:		Yellow Dent (Unrelated):	Sweet Corn:
Family	Members	Co109, ND246,	C13, Iowa5125, P39, 2132
B14	CM105, A632, B64, B68	Oh7, T232,	
B37	B37, B76, H84	W117, W153R,	Popcorn:
B73	N192, A679, B73, NC268	W18BN	SG1533, 4722, HP301, HP7211
C103	Mo17, Va102, Va35, A682		
Oh43	A619, MS71, H99, Va26	White Dent:	Pipecorn:
WF9	W64A, A554, A654, Pa91	C166, H105, Ky228	Mo15W, Mo16W, Mo24W

Ceres/worddata/doug/96pvp

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EXHIBIT C: PHDG1

1. TYPE: (describe intermediate types in Comments section):

2 1=Sweet 2=Dent 3=Flint 4=Flour 5=Pop 6=Ornamental

Standard Variety Name : W64A

2. REGION WHERE DEVELOPED IN THE U.S.A.:

2 1=Northwest 2=Northcentral 3=Northeast 4=Southeast 5=Southcentral 6=Southwest 7=Other

Standard Seed Source : AMES 19291

3. MATURITY (In Region of Best Adaptability; show Heat Unit formula in 'Comments' section)

DAYS	HEAT UNITS		DAYS	HEAT UNITS
068	1,341.8	From emergence to 50% of plants in silk	066	1,317.4
066	1,289.0	From emergence to 50% of plants in pollen	065	1,291.8
004	0,096.8	From 10% to 90% pollen shed	005	0,113.6
		From 50% silk to optimum edible quality		
068	1,274.2	From 50% silk to harvest at 25% moisture	066	1,268.6

4. PLANT:		Standard Deviation	Sample Size		Standard Deviation	Sample Size
208.6	cm Plant Height (to tassel tip)	10.14	05	165.4	05.37	05
078.2	cm Ear Height (to base of top ear node)	10.92	05	060.2	03.90	05
015.6	cm Length of Top Ear Internode	01.14	05	012.1	01.14	05
0.0	Average Number of Tillers	00.02	05	0.0	00.01	05
1.2	Average Number of Ears per Stalk	00.45	05	1.0	00.00	05
2	Anthocyanin of Brace Roots: 1=Absent 2=Faint 3=Moderate 4=Dark			4		

5. LEAF:		Standard Deviation	Sample Size		Standard Deviation	Sample Size
08.2	cm Width of Ear Node Leaf	00.38	05	08.6	00.73	05
81.4	cm Length of Ear Node Leaf	04.33	05	62.5	06.48	05
06	Number of leaves above top ear	00.26	05	05	00.68	05
39	Degrees Leaf Angle (measure from 2nd leaf above ear at anthesis to stalk above leaf)	05.28	05	44	04.28	05
03	Leaf Color (Munsell code)	5GY 4/4		03	5GY 4/4	
1	Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz)			1		
7	Marginal Waves (Rate on scale from 1=none to 9=many)			6		
6	Longitudinal Creases (Rate on scale from 1=none to 9=many)			6		

6. TASSEL:		Standard Deviation	Sample Size		Standard Deviation	Sample Size
14	Number of Primary Lateral Branches	02.21	05	05	01.58	05
59	Branch Angle from Central Spike	22.15	05	24	08.19	05
56.8	cm Tassel Length (from top leaf collar to tassel tip)	01.57	04	50.1	03.76	04
7	Pollen Shed (rate on scale from 0=male sterile to 9=heavy shed)			7		
07	Anther Color (Munsell code)	10Y 8.5/8		07	10Y 8.5/8	
01	Glume Color (Munsell code)	5GY 6/6		01	5GY 6/6	
1	Bar Glumes (Glume Bands): 1=Absent 2=Present			1		

JMS 7/27/00

Application Variety Data	PHDG1	Page 2	Standard Inbred Data

7a. EAR (Unhusked Data):				
11 ~~01~~	Silk Color (3 days after emergence) (Munsell code)	10RP6/6 ~~7.5YR6~~	07	2.5GY96
02	Fresh Husk Color (25 days after 50% silking) (Munsell code)	5GY56	01	5GY78
21	Dry Husk Color (65 days after 50% silking) (Munsell code)	2.5Y84	21	2.5Y8.54
1	Position of Ear at Dry Husk Stage: 1= Upright 2= Horizontal 3= Pendant		3	
5	Husk Tightness (Rate of Scale from 1=very loose to 9=very tight)		6	
2	Husk Extension (at harvest): 1=Short (ears exposed) 2=Medium (<8 cm)		2	
	3=Long (8-10 cm beyond ear tip) 4=Very Long (>10 cm)			

7b. EAR (Husked Ear Data):		Standard Deviation	Sample Size	Standard Deviation	Sample Size
15.1	cm Ear Length	01.02	05	12.7 00.71	05
43.0	mm Ear Diameter at mid-point	02.36	05	41.8 01.38	05
117.2	gm Ear Weight	14.00	05	86.6 07.73	05
15	Number of Kernel Rows	00.56	05	17.1 01.60	05
2	Kernel Rows: 1=Indistinct 2=Distinct			2	
1	Row Alignment: 1=Straight 2=Slightly Curved 3=Spiral			1	
14.8	cm Shank Length	02.95	05	09.5 00.72	05
1	Ear Taper: 1=Slight 2= Average 3=Extreme			2	

8. KERNEL (Dried)		Standard Deviation	Sample Size	Standard Deviation	Sample Size
10.6	mm Kernel Length	00.50	05	09.2 00.19	04
08.2	mm Kernel Width	00.22	05	07.0 00.71	04
05.1	mm Kernel Thickness	00.50	05	04.4 00.46	04
45.2	% Round Kernels (Shape Grade)	09.50	04	06.0 05.98	04
1	Aleurone Color Pattern: 1-Homozygous 2=Segregating			1	
07	Aluerone Color (Munsell code)	10YR814		07 2.5Y812	
07	Hard Endosperm Color (Munsell code)	10YR714		07 10YR814	
03	Endosperm Type:			3	
	1=Sweet (Su1) 2=Extra Sweet (sh2) 3=Normal Starch 4=High Amylose Starch 5=Waxy Starch 6=High Protein 7=High Lysine 8=Super Sweet (se) 9=High Oil 10=Other_____				
30.4	gm Weight per 100 Kernels (unsized sample)	03.65	05	19.00 04.24	04

9. COB:		Standard Deviation	Sample Size	Standard Deviation	Sample Size
26.4	mm Cob Diameter at mid-point	01.82	05	27.4 01.08	04
14	Cob Color (Munsell code) 10R46			14 2.5YR56	

10. DISEASE RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); leave blank if not tested; leave Race or Strain Options blank if polygenic):		
A. Leaf Blights, Wilts, and Local Infection Diseases		
	Anthracnose Leaf Blight (Colletotrichum graminicola)	
	Common Rust (Puccinia sorghi)	
	Common Smut (Ustilago maydis)	
	Eyespot (Kabatiella zeae)	
7	Goss's Wilt (Clavibacter michiganense spp. nebraskense)	7
5	Gray Leaf Spot (Cercospora zeae-maydis)	2
	Helminthosporium Leaf Spot (Bipolaris zeicola) Race ———	
5	Northern Leaf Blight (Exserohilum turcicum) Race ———	5
	Southern Leaf Blight (Bipolaris maydis) Race ———	
	Southern Rust (Puccinia polysora)	
4	Stewart's Wilt (Erwinia stewartii)	1
	Other (Specify) ———	
B. Systemic Diseases		
3	Corn Lethal Necrosis (MCMV and MDMV)	2
5	Head Smut (Sphacelotheca reiliana)	9
	Maize Chlorotic Dwarf Virus (MDV)	
	Maize Chlorotic Mottle Virus (MCMV)	
	Maize Dwarf Mosaic Virus (MDMV)	
	Sorghum Downy Mildew of Corn (Peronosclerospora sorghi)	
	Other (Specify) ———	
C. Stalk Rots		
	Anthracnose Stalk Rot (Colletotrichum graminicola)	
	Diplodia Stalk Rot (Stenocarpella maydis)	
	Fusarium Stalk Rot (Fusarium moniliforme)	
	Gibberella Stalk Rot (Gibberella zeae)	
	Other (Specify) ———	
D. Ear and Kernel Rots		
	Aspergillus Ear and Kernel Rot (Aspergillus flavus)	
	Diplodia Ear Rot (Stenocarpella maydis)	
	Fusarium Ear and Kernel Rot (Fusarium moniliforme)	
4	Gibberella Ear Rot (Gibberella zeae)	4
	Other (Specify) ———	

11. INSECT RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); (leave blank if not tested) :

	Banks grass Mite (Oligonychus pratensis)	
	Corn Worm (Helicoverpa zea)	
	Leaf Feeding	
	Silk Feeding	
	mg larval wt.	
	Ear Damage	
	Corn Leaf Aphid (Rhopalosiphum maidis)	
	Corn Sap Beetle (Carpophilus dimidiatus	
	European Corn Borer (Ostrinia nubilalis)	
4	1st Generation (Typically Whorl Leaf Feeding)	3
	2nd Generation (Typically Leaf Sheath-Collar Feeding)	
	Stalk Tunneling	
	cm tunneled/plant	
	Fall Armyworm (Spodoptera fruqiperda)	
	Leaf Feeding	
	Silk Feeding	
	mg larval wt.	
	Maize Weevil (Sitophilus zeamaize	
	Northern Rootworm (Diabrotica barberi)	
	Southern Rootworm (Diabrotica undecimpunctata)	
	Southwestern Corn Borer (Diatreaea grandiosella)	
	Leaf Feeding	
	Stalk Tunneling	
	cm tunneled/plant	
	Two-spotted Spider Mite (Tetranychus urticae)	
	Western Rootworm (Diabrotica virgifrea virgifera)	
	Other (Specify) ———	

12. AGRONOMIC TRAITS:

7	Staygreen (at 65 days after anthesis) (Rate on a scale from 1=worst to excellent)	4
1.0	% Dropped Ears (at 65 days after anthesis)	0.2
	% Pre-anthesis Brittle Snapping	
	% Pre-anthesis Root Lodging	
11.7	Post-anthesis Root Lodging (at 65 days after anthesis)	7.7
3,844.3	Kg/ha Yield of Inbred Per Se (at 12-13% grain moisture)	2,537.1

13. MOLECULAR MARKERS: (0=data unavailable; 1=data available but not supplied; 2=data supplied):

1 Isozymes 0 RFLP's 0 RAPD's

COMMENTS (eg. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in Exhibit D):

CLARIFICATION OF DATA IN EXHIBITS C AND D

Please note the data presented in Exhibit C, "Objective Description of Variety," is data collected primarily at Johnston, Iowa plus description information from the maintaining station. The data in Exhibit D, "Additional Description of Variety," is data from comparisons of inbreds grown in the same tests in the adapted growing area of PHDG1.

JMS
5/25/00

There are environmental factors that differ from year to year. In 1995, May was wet and August was warmer. In 1996, May was very wet and August was cool with very little heat or drought stress compared to most years. Environmental temperature and precipitation differences during the vegetative and grain fill periods can impact plant and grain traits and be a source of variability. Please see table 3, which summarizes rainfall and growing season temperatures from 1994-1997. The environmental conditions described above could result in larger standard deviations. Also, in particular the tassel branch angle trait is very subject to variability based on how a person measures it. We try to monitor our measuring procedures carefully but measuring the angle from different primary branches could result in higher variability for this trait. Since I was not involved in the data collection of this trait at that time I am not sure what caused the variability for this trait.

Table 3. Average temperatures (Fahrenheit) and rainfall (inches) for central Iowa.

TEMPERATURE

YEAR	MAY	JUN	JULY	AUG	AVERAGE
1994	59.8	70.7	71.9	69.0	**67.9**
1995	56.2	69.4	74.3	76.9	**69.2**
1996	56.2	69.3	71.3	70.5	**66.8**
1997	53.5	70.6	74.1	69.6	**67.0**
AVG	**56.4**	**70.0**	**72.9**	**71.5**	**67.7**

RAINFALL

YEAR	MAY	JUN	JULY	AUG	Total
1994	3.67	5.75	1.71	4.18	**15.31**
1995	5.04	4.19	2.94	2.87	**15.04**
1996	8.47	4.35	2.51	2.14	**17.47**
1997	4.32	3.27	4.10	1.36	**13.05**
AVG	**5.38**	**4.39**	**2.82**	**2.64**	**15.22**

EXHIBIT D. ADDITIONAL DESCRIPTION OF PHDG1

INBRED PER SE YIELD TEST COMPARISON OF PHDG1 AND PHR31 EVALUATED OVER YEARS

VARIETY #1 = PHDG1
VARIETY #2 = PHR31

* = 10% SIG + = 5% SIG # = 1% SIG

YEAR	REGION	VAR #	BU ACR ABS	BU ACR %MN	MST ABS	TST WT ABS	GQU /HA ABS	GQU /HA %MN	SDG VGR ABS	EST CNT ABS	GDU SHD ABS	GDU SLK ABS	RT LDG ABS	STA GRN ABS	STK LDG ABS	BRT STK ABS	GRN APP ABS	BAR PLT ABS	DRP EAR ABS
93	SUM	1	92.7	103	16.4		58.2	103	6.0	26.3	1309	1348	100.0	5.2	100.0	93.1		97.8	
		2	103.9	118	15.6		65.2	118	5.0	26.4	1353	1385	100.0	3.7	90.5	96.1		97.1	
		LOCS	3	3	3		3	3	23	38	49	48	2	6	1	7		6	
		REPS	6	6	6		6	6	25	65	55	54	3	6	2	7		6	
		DIFF	11.2	15	0.8		7.0	15	1.0	0.1	44	37	0.0	1.5	9.5	3.0		0.7	
		PR > T	.681	.589	.109		.681	.589	.010+	.964	.000#	.000#	.999	.215		.481		.774	
94	SUM	1	107.0	119	26.5	52.4	67.1	119	5.9	39.0	1343	1389	52.2	5.7	99.4	80.0	5.5	96.7	100.0
		2	90.5	100	26.7	51.7	56.7	100	5.4	43.0	1384	1411	87.9	5.3	99.2	100.0	5.6	99.3	100.0
		LOCS	9	9	11	9	9	9	7	26	20	17	3	3	6	1	4	13	5
		REPS	18	18	20	18	18	18	9	35	22	17	4	3	11	1	8	15	10
		DIFF	16.5	19	0.2	0.7	10.4	19	0.5	4.0	41	22	35.7	0.4	0.2	20.0	0.1	2.6	0.0
		PR > T	.081*	.075*	.871	.117	.081*	.075*	.334	.006#	.000#	.038+	.231	.808	.755		.861	.151	.999
95	SUM	1	61.2	121	15.4	58.4	38.3	121	6.2	29.8	1345	1380	100.0	6.8	95.1		8.3	100.0	98.4
		2	54.2	106	15.5	55.5	34.0	106	5.2	31.8	1397	1432	95.7	5.0	82.2		7.0	100.0	100.0
		LOCS	4	4	4	3	4	4	6	10	13	13	1	3	4		3	3	3
		REPS	7	7	7	6	7	7	8	14	16	16	1	5	7		6	3	6
		DIFF	7.0	15	0.1	2.9	4.3	15	1.0	2.0	52	52	4.3	1.8	12.9		1.3	0.0	1.6
		PR > T	.492	.447	.881	.108	.492	.447	.136	.003#	.005#	.002#		.093*	.216		.287	.999	.033+
96	SUM	1	62.0	145	21.0	54.9	38.9	145	5.3	41.8	1364	1426	100.0	8.3	96.6	87.0	7.0	100.0	100.0
		2	54.5	123	21.5	51.8	34.1	123	4.9	42.5	1433	1463	100.0	7.0	85.4	92.3	7.8	98.1	100.0
		LOCS	4	4	4	4	4	4	7	13	16	16	1	3	3	1	4	2	2
		REPS	4	4	4	4	4	4	7	13	16	16	1	3	3	1	4	2	2
		DIFF	7.5	22	0.5	3.1	4.8	22	0.4	0.7	69	37	0.0	1.3	11.2	5.3	0.8	1.9	0.0
		PR > T	.650	.619	.617	.185	.650	.619	.078*	.661	.000#	.007#		.270	.108		.571	.500	.999
TOTAL	SUM	1	86.7	122	21.6	54.2	54.4	122	5.5	32.6	1325	1368	78.6	6.2	97.6	93.2	6.6	97.6	99.5
		2	78.0	109	21.6	52.4	48.9	109	4.9	33.9	1369	1399	93.9	4.5	90.8	97.1	6.6	98.9	100.0
		LOCS	20	20	24	16	20	20	59	116	128	124	8	20	14	12	12	34	10
		REPS	35	35	39	28	35	35	65	159	143	137	10	22	23	12	19	36	18
		DIFF	8.7	13	0.0	1.7	5.4	13	0.7	1.3	44	31	15.3	1.6	6.9	3.8	0.0	1.3	0.5
		PR > T	.165	.179	.999	.010+	.165	.179	.002#	.028+	.000#	.000#	.149	.006#	.028+	.182	.999	.147	.094*

*PR > T values are valid only for comparisons with LOCS >= 10.

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U. S. C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
PIONEER HI-BRED INTERNATIONAL, INC.		**PHDG1**

4 .ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	5. TELEPHONE *(include area code)*	6. FAX *(include area code)*
7301 NW 62nd AVENUE **P.O.BOX 85** **JOHNSTON, IA 50131-0085**	**515-270-4051**	**515-253-2125**
	7. PVPO NUMBER 9700196	

8. Does the applicant own all rights to the variety? *Mark an "X" in appropriate block.* ***If no, please explain:*** ☒ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company? ☒ YES ☐ NO

If no, give name of country

10. Is the applicant the original owner? ☒ YES ☐ NO ***If no, please answer one of the following:***

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?

☐ YES ☐ NO ***if no, give name of country***

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

☒ YES ☐ NO ***If no, give name of country***

11. Additional explanation on ownership *(if needed, use reverse for extra space)*:

PHDG1 is owned by Pioneer Hi-Bred International, Inc.

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country Which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See section 41(a)(2) of the Plant Variety Protection Act for definition.

STD-470-E (07-97) *(Destroy previous editions).*
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